

VOLUME 23
JULY 1, 1981 - June 30, 1982
FEDERAL AID IN FISH RESTORATION
AND
ANADROMOUS FISH STUDIES

HARVEST OF SELECTED
FISHERIES THROUGHOUT
SOUTHEASTERN ALASKA

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STATE OF ALASKA

Jay S. Hammond, Governor

Annual Performance Report for

HARVEST ESTIMATES OF SELECTED FISHERIES
THROUGHOUT SOUTHEAST ALASKA

by

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RESEARCH PROJECT SEGMENT

State: Alaska Name: Sport Fish Investigations
of Alaska

Project No.: F-9-14

Study No.: G-I Study Title: INVENTORY & CATALOGING

Job No.: G-I-Q-8 Job Title: Harvest Estimates of
Selected Fisheries
Throughout Southeast
Alaska

Cooperators: Herman Savikko, Mark W. Schwan

Period Covered: July 1, 1981 to June 30, 1982

ABSTRACT

A creel survey program was conducted from May 1 through September 29, 1981, to estimate the sport fishing effort and harvest by Juneau area boating anglers and to determine the contribution of facility-reared and tagged wild salmon stocks to the sport fishery. Two creel technicians interviewed returning marine anglers at local harbors and boat ramps according to a prearranged sampling schedule. Interviews were oriented toward obtaining data on the effort and catch by marine anglers contacted, but additional information was also gathered.

Periodic aerial surveys were conducted over the entire marine sport fishing harvest area in order to assess the total boat fishing activity during the survey season. Dock-side interview data and aerial boat count data were analyzed and coordinated, and estimates of total effort and catch were generated.

Juneau area marine boating anglers expended an estimated 202,431 angler hours of effort to catch 3,292 chinook salmon, Oncorhynchus tshawytscha (Walbaum), 6,897 coho salmon, O. kisutch (Walbaum), 3,604 pink salmon, O. gorbuscha (Walbaum), 171 chum salmon, O. keta (Walbaum), 47 sockeye salmon, O. nerka (Walbaum), 336 Dolly Varden, Salvelinus malma (Walbaum), 7,640 Pacific halibut, Hippoglossus stenolepis Schmidt, and 3,032 other demersal fishes, (Pleuronectidae, Gadidae, Hexagrammidae, and Scorpaenidae). These estimates exclude derby effort and catch.

The 35th Golden North Salmon Derby was held August 7, 8, and 9, 1981. There were 7,524 angler validations for this 3-day event. Estimates of the numbers of salmon entered and taken home are as follows: chinook, 436 entered and 437 taken home; coho, 541 entered and 1,223 taken home; pink, 104 entered and 186 taken home; and chum, 22 entered and 3 taken home. In addition, an estimated 1,002 halibut were taken home during the derby.

KEY WORDS

Juneau sport fishing, creel survey, harvest estimates, salmon sport harvest, sport fish effort, angling effort, halibut sport harvest, southeast Alaska sport fishing, marked salmon recoveries.

BACKGROUND

The allocation of resources to multiple user groups often presents problems for resource managers. In the Juneau area, there has been a long history of user conflicts and increasing angling pressure on fish stocks. Marriott et al. (1979) documented these problems in the Juneau sport fishery and also succinctly described the trend in the sport fishery regulations toward more restrictive bag and possession limits.

Creel sampling programs have been implemented for estimating the angling effort and catch by sport anglers and for determining the contribution of salmon from enhancement projects in the Juneau area to the saltwater sport fishery (Robards, 1978; Marriott et al., 1979; Schwan, 1980; 1981). The Juneau boat sport fishery should continue to be monitored because of possible allocation conflicts among different user groups. Allocation problems cannot be resolved, or even clearly elucidated, if the harvest of a resource by a particular user group goes unmeasured.

RECOMMENDATIONS

Management

1. The daily bag and possession limit of one chinook salmon in the Juneau area should remain in effect. Furthermore, the area north of the latitude of Limestone Inlet (south end) to a line from Point Louisa to Piling Point (north end) should remain closed for the period April 16 through June 14 to help ensure adequate escapements of chinook salmon into southeast Alaska's chinook systems, primarily the Taku River. With the increased angler effort in the Juneau area, this regulation will continue to be necessary until all age classes of the Taku chinook salmon stocks have increased in population size.

Research

1. The Juneau marine creel survey program should continue in 1982. Creel survey sampling should begin earlier, e.g., April 15, to obtain information on the early season chinook catches.
2. Tag recovery and analysis should continue. Wild and hatchery-reared chinook and coho salmon will continue to contribute to the Juneau marine sport fishery.
3. Intensify efforts to increase voluntary returns of tagged salmon. This can be done by educating the public through press releases, posted bulletins, and possible informative broadcasts on the local public television station.

4. Assess the probability that an angler will realize that he or she has a tagged fish to determine a probability of awareness factor. This can then be used in conjunction with voluntary returns to create a much larger sample size, a definite statistical benefit.
5. The sport harvest of marine demersal fishes should continue to be monitored. Many of these species are slow growing and long lived, and some species of rockfish exhibit strong home site preference. These attributes could facilitate rapid stock depletion resulting from excessive fishing pressure, especially as more anglers turn toward demersal fishes when salmon fishing is unproductive.
6. When the Roadside Rehabilitation project becomes operational in the Juneau area, on-site creel surveys will be required on a continuing basis. Supplementation of harvest data via the statewide questionnaire may be necessary.

OBJECTIVES

1. Determine the saltwater boating angler effort and catch of sport fishes in the Juneau area, which includes estimating the contribution of hatchery stocks via recovery of micro-tagged fishes.

TECHNIQUES USED

Methods - Juneau Recreational Harvest Study

Marine Boat Recreational Harvest Study:

Saltwater boating anglers were interviewed upon their return to local harbors and boat ramps from May 1 through September 30, 1981. Boating parties were asked if they had engaged in recreational fishing during their outing. If so, the number of anglers in the boating party was recorded. Each angler was asked (1) how long they had fished, (2) what the target species was, (3) areas fished, (4) the number and species of fish kept, and (5) the number, if any, of undersized chinook salmon caught and released.

Biological data were taken from certain fish in the creel. Scale samples, fork lengths, and weights were taken from all chinook salmon when possible. Fork lengths were recorded from Pacific halibut. Chinook and coho salmon were checked for missing adipose fins; the heads from such fish were collected and the micro-wire tags were removed at a later date.

Creel technicians stationed themselves at a specific harbor or ramp from noon until dusk on the sampling day. All traditional public access points were covered. However, those harbors and ramps known to support light angler access were sampled less frequently. Access points were put into three strata: Auke Bay, Tee Harbor, and "Other". The "Other" stratum included Amalga Harbor, Fishermen's Bend, Aurora Harbor, Harris Harbor, North Douglas ramp, and Douglas Harbor (see Figure 1).

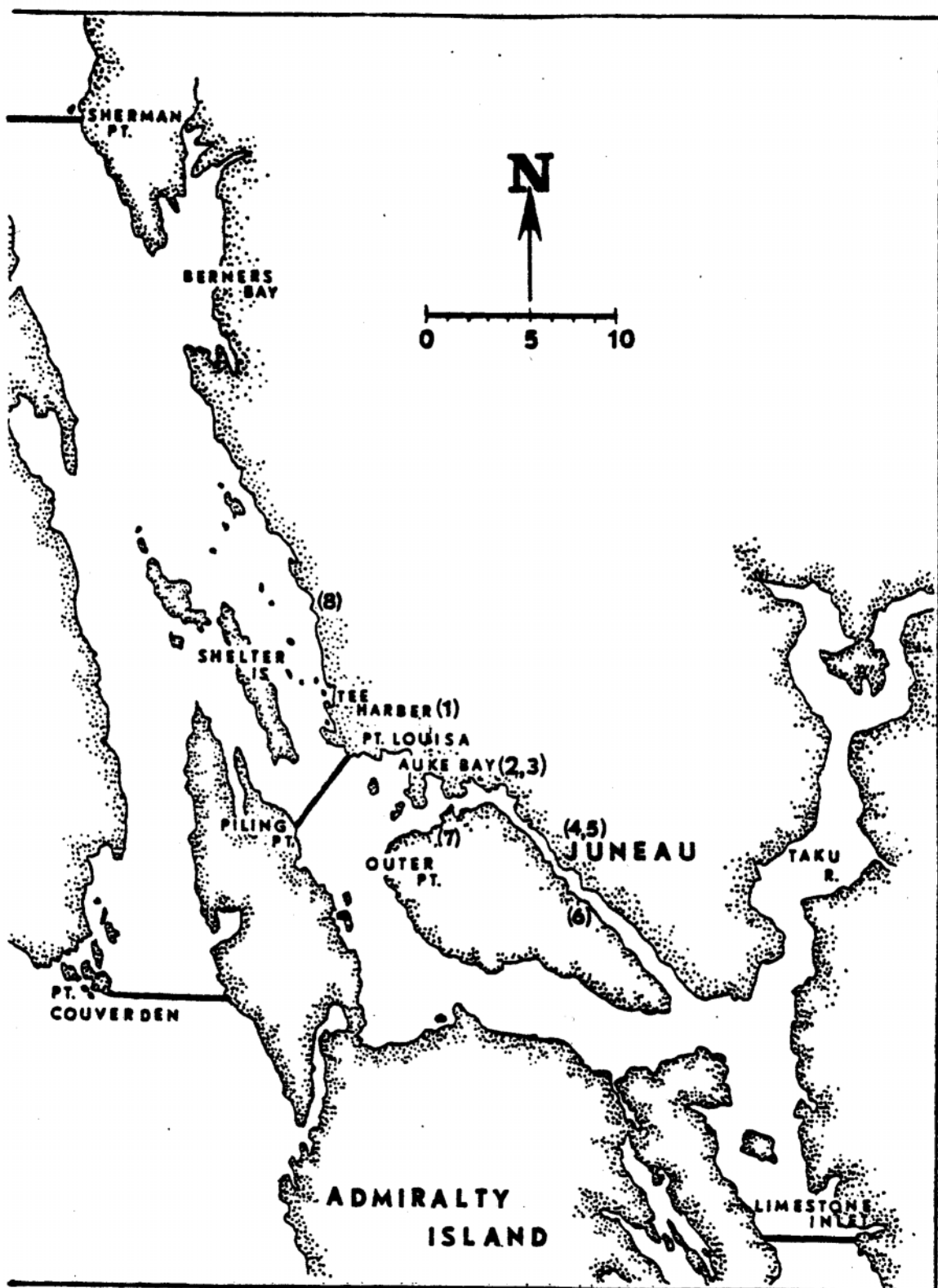


Figure 1. Map of the Juneau Area Marine Recreational Fishery and Creel Survey

Locations: 1) Tee Harbor; 2) Auke Bay; 3) Fisherman's Bend;
 4) Aurora Harbor; 5) Harris Harbor; 6) Douglas Harbor;
 7) North Douglas Boat Ramp; 8) Amalga Harbor

Each week Auke Bay was covered on two randomly selected weekdays and one randomly selected weekend day. Tee Harbor was covered twice each week, on one weekday and on one weekend day selected randomly. "Other" access points were also sampled twice each week, again one randomly selected weekday and one randomly selected weekend day. The specific harbor within this composite stratum was selected randomly; however, during the spring south-end closure on chinook angling, south-end harbors were not covered.

Figure 1 is a map of the Juneau marine area.

Procedure of Estimation of Total Effort and Catch

One-hour flights were conducted over the Juneau area marine recreational fishing area throughout the survey season. Flight days and flight times were picked on a random basis; however, days were stratified into weekdays and weekends/holidays. The number of boats seen with poles out were counted during the flights, which represented the total angling effort in the area for that hour.

An estimate of total marine angling effort for the season was determined in the following way:

$$A\hat{H}_i = (\bar{c}_i)(\bar{a}_i)(\bar{h})(d_i)$$

where: i = stratum (weekdays or weekends/holidays)

\bar{c}_i = mean count of boats/hr for stratum i

\bar{a}_i = mean count of anglers/boat for stratum i

\bar{h} = mean hours in the fishing day (11 hours)

d_i = days in the season for stratum i

$A\hat{H}_i$ = estimate of angler hours in stratum i

$$\text{then: } A\hat{H}_{\text{season}} = \sum A\hat{H}_i$$

Estimates of harvest for the various species of game fishes were generated by multiplying the season catch rate (catch per unit of effort or CPUE) for a species by the estimated total seasonal effort (angler-hours). Seasonal catch rates used for estimating harvest were determined by taking the total seasonal sample catch of each species and dividing it by the total sampled effort (for all targeted species) intercepted all season at all sampled access points.

Golden North Salmon Derby

The 35th Golden North Salmon Derby was held on August 7, 8, and 9, 1981. Fish and Game personnel were stationed at the official derby weigh-in stations (judges' floats) at Auke Bay, Tee Harbor, and Douglas harbor,

where they identified and weighed all salmon entered in the weight competition. When possible, fork lengths were recorded and scales collected from chinook salmon. Salmon entered for door prizes were identified and chinook salmon measured for legal length (>711 mm) requirements. All fish were examined for missing adipose fins and any such fish were tagged using surveyor's tape for quick recognition at the local cold storage facility. When intercepted at the cold storage their heads were severed and saved. Micro wire tags were removed at a later date. Numbers and poundage of derby fish were obtained from cold storage personnel.

Derby anglers were interviewed as to how many and what kinds of fish they were taking home. When possible, take-home salmon were examined for missing adipose fins. Using the information gathered, take-home ratios for each species caught each day were calculated by dividing the number of anglers interviewed into the sampled catch by species.

The number of angler validations (representing angler trips) at each location for every day was obtained from derby officials. These figures were then multiplied by the corresponding sample take-home ratios to estimate the take home catch for each species. Daily catches were summed to obtain a total catch per species at each individual harbor. Catches by anglers from each harbor were then summed to obtain the total take home during the derby.

FINDINGS

Juneau Area Marine Recreational Harvest Study

An estimated 41,220 angler trips, representing 202,431 angler-hours of effort, were made during the survey season, May through September, 1981. The resulting estimated catches were: 3,292 chinook salmon, 6,897 coho salmon, 3,604 pink salmon, 171 chum salmon, and 47 sockeye salmon. Table 1 is a list of common names, scientific names, and abbreviations.

Additionally, 336 Dolly Varden char, 7,640 Pacific halibut, 1,451 rockfishes, 1,351 cods, and 183 flatfishes were harvested by Juneau boat anglers during this harvest study season (Table 2). These estimates do not include effort and catches during the 35th Golden North Salmon Derby (see Tables 2 and 3 for derby catches).

Estimates of harvest for the various species of game fishes were generated by multiplying the season catch rate (catch per unit of effort for CPUE) for a species by the estimated total seasonal effort (angler-hours). Seasonal catch rates used for estimating harvest were determined by taking the total seasonal sample catch of each species and dividing it by the total sampled effort (for all targeted species) intercepted all season at all sampled access points.

The following equation was used to estimate total tagged fish of a particular species caught in the sport fishery:

Table 1. List of common names, scientific names, and abbreviations.

Common Name	Scientific Name and Author	Abbreviation
Pink salmon	<u>Oncorhynchus gorbuscha</u> (Walbaum)	PS
Chinook salmon	<u>Oncorhynchus tshawytscha</u> (Walbaum)	KS
Chum salmon	<u>Oncorhynchus keta</u> (Walbaum)	CS
Coho salmon	<u>Oncorhynchus kisutch</u> (Walbaum)	SS
Sockeye salmon	<u>Oncorhynchus nerka</u> (Walbaum)	RS
Dolly Varden	<u>Salvelinus malma</u> (Walbaum)	DV
Rainbow trout	<u>Salmo gairdneri</u> Richardson	RT
Steelhead	<u>Salmo gairdneri</u> Richardson	SH
Cutthroat trout	<u>Salmo clarki</u> Richardson	CT
Brook char	<u>Salvelinus fontinalis</u> (Mitchell)	BT
Arctic grayling	<u>Thymallus arcticus</u> (Pallas)	GR
Pacific halibut	<u>Hippoglossus stenolepis</u> Schmidt	H
Flounder	<u>Pleuronectidae</u> spp.	FF
Sablefish	<u>Anaplopoma fimbria</u> (Pallas)	
Rockfish	<u>Sebastes</u> spp.	RF

Table 2. Estimates of Total Catch in 1981 Marine Juneau Sport and Derby Fishery

	KS	KS*	SS	PS	RS	CS	DV	H	RF	Cod	FF	Other
May-September Recreational Harvest	3,292	843	6,897	3,604	47	171	366	7,640	1,451	1,351	183	47
35th Golden North Derby	873	...	1,764	290	0	25	...	1,002	...	...	...	...
TOTAL	4,165	843	8,661	3,894	47	196	366	8,642	1,451	1,351	183	47

∞ * Released chinook salmon, including those less than 711 mm (28 inches) in total length from June 15 through September 30.

Table 3. Comparison of Golden North Salmon Derby angler effort and catch estimates, 1971-1981.

Year	Dates Held	Angler Validations	<u>Chinook Salmon</u>		<u>Coho Salmon</u>		<u>Pink Salmon</u>		<u>Chum Salmon</u>		<u>Sockeye Salmon</u>		<u>Halibut</u>
			Entered	Taken Home	Entered	Taken Home	Entered	Taken Home	Entered	Taken Home	Entered	Taken Home	Taken Home
1971	July 16-18	7,434	682	...	1,331	...	409	...	226	...	...	...	...
1972	July 21-23	8,199	528	...	1,817	...	328	...	123	...	...	...	...
1973	July 20-22	7,915	637	...	449	...	278	...	34	...	...	...	...
1974	July 26-28	7,714	291	...	1,526	...	226	...	24	...	...	...	...
1975	July 18-20	7,847	276	184	315	354	174	531	15	14	0	0	...
1976	July 23-25	8,466	136	167	536	1,135	58	96	4	12	1	0	...
1977	Aug. 05-07	8,762	161	355	1,206	2,419	259	55	28	1	1	0	...
1978	Aug. 11-13	8,283	210	40	1,779	1,076	122	98	13	9	0	0	...
1979	Aug. 03-05	8,327	350	657	663	2,561	98	242	52	44	0	5	490
1980	Aug. 22-24	7,386	271	206	694	1,583	67	145	97	33	0	0	502
1981	Aug. 07-09	7,524	436	437	541	1,223	104	186	22	3	0	0	1,002

Starting with the relation:

$$(1) \frac{\text{Marked fish in sample}}{\text{All fish in sample}} = \frac{\text{Est. of total marked fish caught}}{\text{Est. of all fish caught}}$$

Then the estimate of total marked fish caught equals

$$\frac{\text{Marked fish in sample} \times \text{Est. of all fish caught}}{\text{All fish in sample}}$$

This equation is analogous to the Peterson Index which is based on the assumption that the sample accurately represents what is found in the entire population (Ricker, 1975).

Estimating the contribution of a facility (hatchery) release of fish to a fishery, where the total release is known and not all fish are marked but the marked portion is known, can be done by multiplying the estimated number of marked fish caught in the fishery by the ratio of total fish released to the number of marked fish released. That is:

Contribution to fishery =

$$(2) \text{ Est. total marked fish caught in fishery} \times \frac{\text{total release}}{\text{marked release}}$$

Tag recovery data are presented in Table 4, indicating the tag codes which appeared in the fishery and the estimated contributions of select stocks to the Juneau marine sport fishery during 1981.

Table 5 shows catch rates by species during each week of the survey period. Table 6 shows estimates of effort and catch during 1981 compared to estimates from past years.

Discussion

During the entire five months that the creel survey operated, local marine anglers expended an estimated 202,431 angler-hours of effort. The Juneau marine area fishing pressure from May 1 through September 3 totaled 184,598 angler-hours of effort (Figure 2). This was the lowest effort for this time period seen in 5 years. The seasonal mean count for boats with active angling in the survey area on the weekdays was 30.53 per hour. A mean of 2.38 anglers per boat fished during the weekday stratum. The mean number of boats with active angling each hour during the weekends was 89.67, with 2.54 anglers per boat. Statistically, there was a significant difference between the mean number of anglers per boat between these two strata (t-value of 4.59 with 2,612 degrees of freedom). Table 5 shows catch rates by week for the principal species during the 1981 survey season.

Chinook Salmon

The catch success for chinook salmon by marine anglers was analyzed by weekday versus weekend day. The observed mean CPUE for chinook was .031

Table 4. Summary of CWT hatchery chinook salmon, wild chinook, and wild coho salmon captured in the Juneau marine sport fishery, 1981.

Species	Facility	Binary Code/ Fin Clip	Date and Location of Release	Marked Fish in Release Group	Total Release	Creel Sample Recoveries	Derby Sample Recoveries	Voluntary Recoveries	Estimated Stock Contribution to Fishery
11	<u>Hatchery</u>								
	KS Crystal Lake	AD/4-16-16	6/77 Blind Slough	71,227	166,030	1	3	1	28
	KS Crystal Lake	AD/4-18-36	5/78 106-44-031	21,136	21,221	1	0	0	6
	KS Little Port Walter	AD/3-16-12	4/78 Little Port Walter	4,552	4,570	0	1	0	2
	KS Little Port Walter	AD/3-16-13	5/78 Little Port Walter	4,472	4,490	1	1	0	8
	KS Little Port Walter	AD/3-16-14	5/78 Little Port Walter	4,373	4,391	1	1	2	8
	KS Little Port Walter	AD/3-16-17	6/78 Little Port Walter	4,184	4,201	0	1	0	2
	KS Cowlitz	AD/63-17-9	3/78 Cowlitz R., WA	89,433	90,446	0	1	0	2
	KS Klickitat	AD/63-17-50	3/79 Klickitat R., WA	95,766	112,117	1	0	1	7
	KS Bonneville	AD/7-16-61	3/79 Tanner Cr., OR	32,745	32,749	1	0	0	6
	KS South Santiam	AD/7-19-23	3/79 Willamette R. (Below Falls) OR	34,512	36,417	0	1	0	2
KS	Dexter Ponds	AD/7-17-42	3/79 Mid Fork Willamette R., OR	29,463	258,677	0	0	1	unknown

Table 4. (Cont'd.) Summary of CWT hatchery chinook salmon, wild chinook, and wild coho salmon captured in the Juneau marine sport fishery, 1981.

Species	Facility	Binary Code/ Fin Clip	Date and Location of Release	Marked Fish in Release Group	Total Release	Creel Sample Recoveries	Derby Sample Recoveries	Voluntary Recoveries	Estimated Stock Contribution to Fishery
KS	Oakridge	AD/7-17-44	3/79 Mid Fork Willamette R., OR	32,835	32,835	0	0	1	unknown
KS	Kitimat	AD/2-16-14	5/79 Kitimat R., B.C.	73,436	151,770	1	0	0	12
KS	Willamette & South Santiam	AD/9-16-22	3/78 Willamette R., (Above Falls) OR	29,533	32,418	0	0	1	unknown
<u>Wild Stocks</u>									
KS	Taku River	AD/4-5-8	4/77-5/77, 11-32-032	5,304	unknown	0	0	1	unknown
KS	Taku River	AD/4-5-9	5/77, 11-32-032	4,555	unknown	0	0	1	unknown
KS	Taku River	AD/4-17-22	4/78, 11-32-032	3,717	unknown	0	0	1	unknown
KS	Atnarko River	AD/2-20-22	6/78-7/78	57,654	unknown	0	1	0	unknown
<u>Hatchery</u>									
SS	Auke Creek	AD/3-16-59	5/80-6/80, Auke Cr.	842	998	0	0	1	unknown
<u>Wild Stocks</u>									
SS	Speel Lake	AD/4-17-52	9/79, 111-33-030	6,702	unknown	1	0	0	unknown
SS	Auke Lake	AD/4-19-49	5/80-6/80, 111-50-042	5,491	unknown	2	0	1	unknown

Table 4. (Cont'd.) Summary of CWT hatchery chinook salmon, wild chinook, and wild coho salmon captured in the Juneau marine sport fishery, 1981.

Species	Facility	Binary Code/ Fin Clip	Date and Location of Release	Marked Fish in Release Group	Total Release	Creel Sample Recoveries	Derby Sample Recoveries	Voluntary Recoveries	Estimated Stock Contribution to Fishery
SS	Auke Lake	AD/4-19-53	5/80-6/80, 111-50-042	2,804	unknown	0	0	1	unknown
SS	Auke Lake	AD/4-19-54	5/80-6/80, 111-50-042	1,526	unknown	<u>1</u>	<u>0</u>	<u>0</u>	<u>unknown</u>
					TOTALS	11	10	13	83 + unknown

Table 5. 1981 Weekly CPUE Juneau Marine Sport Fishery.

Statistical Week	Start Date	% Effort Targeting on Salmon	% Effort Targeting on Halibut	CPUE (HOURS/FISH BASED ON TARGET HOURS FISHED)					
				Chinook	Small Chinook (released)	Coho	Pink	Dolly Varden	Halibut
19	5/01	78.3	21.7	32.2	300.0	...	...	...	20.8
20	5/04	87.7	12.3	18.1	188.0	...	...	...	12.0
21	5/11	89.0	11.0	23.7	285.0	...	...	...	7.2
22	5/18	76.3	23.7	68.4	570.0	...	...	...	15.2
23	5/25	65.4	34.6	25.4	686.0	...	...	...	13.4
24	6/01	66.2	33.8	27.1	...	1,137.0	...	...	8.0
25	6/08	48.5	51.5	19.0	760.0	760.0	...	...	11.9
28" MINIMUM SIZE BACK IN EFFECT									
26	6/15	58.3	41.7	37.0	52.4	630.0	140.0	157.0	8.5
27	6/22	62.1	37.9	35.1	67.6	55.6	39.4	189.0	7.8
28	6/29	62.0	38.0	68.3	78.8	20.1	19.0	73.2	6.0
29	7/06	69.8	30.2	34.0	233.0	20.4	19.2	204.0	6.6
30	7/13	72.5	27.5	60.0	148.0	21.6	13.1	213.0	6.8
31	7/20	77.0	23.0	52.0	138.0	15.6	16.8	757.0	5.5
32	7/27	67.2	32.8	124.0	144.0	15.3	20.4	248.0	6.1
33	8/03	Derby Week - Normal Coverage Suspended - See Derby Results Table 1							
34	8/10	74.1	25.9	103.0	309.0	8.8	46.9	...	7.5
35	8/17	79.1	20.9	128.0	156.0	8.7	88.0	1,408.0	10.6
36	8/24	73.5	26.6	75.1	501.0	6.7	53.7	751.0	7.9
37	8/31	72.4	27.6	101.0	67.3	7.8	15.5	...	6.4
38	9/07	64.1	35.9	130.0	...	21.6	259.	...	6.9
39	9/14	71.5	28.5	...	238.0	14.0	...	...	5.0
40	9/21	58.3	41.7	66.5	66.5	33.3	...	...	3.7
Seasonal Means		70.9%	29.1%	43.6	170.1	20.8	39.8	426.8%	7.7

Table 6. Comparative seasonal angler effort and catch for Juneau area marine recreational fishery, May 1 through September 3, 1971-1981.

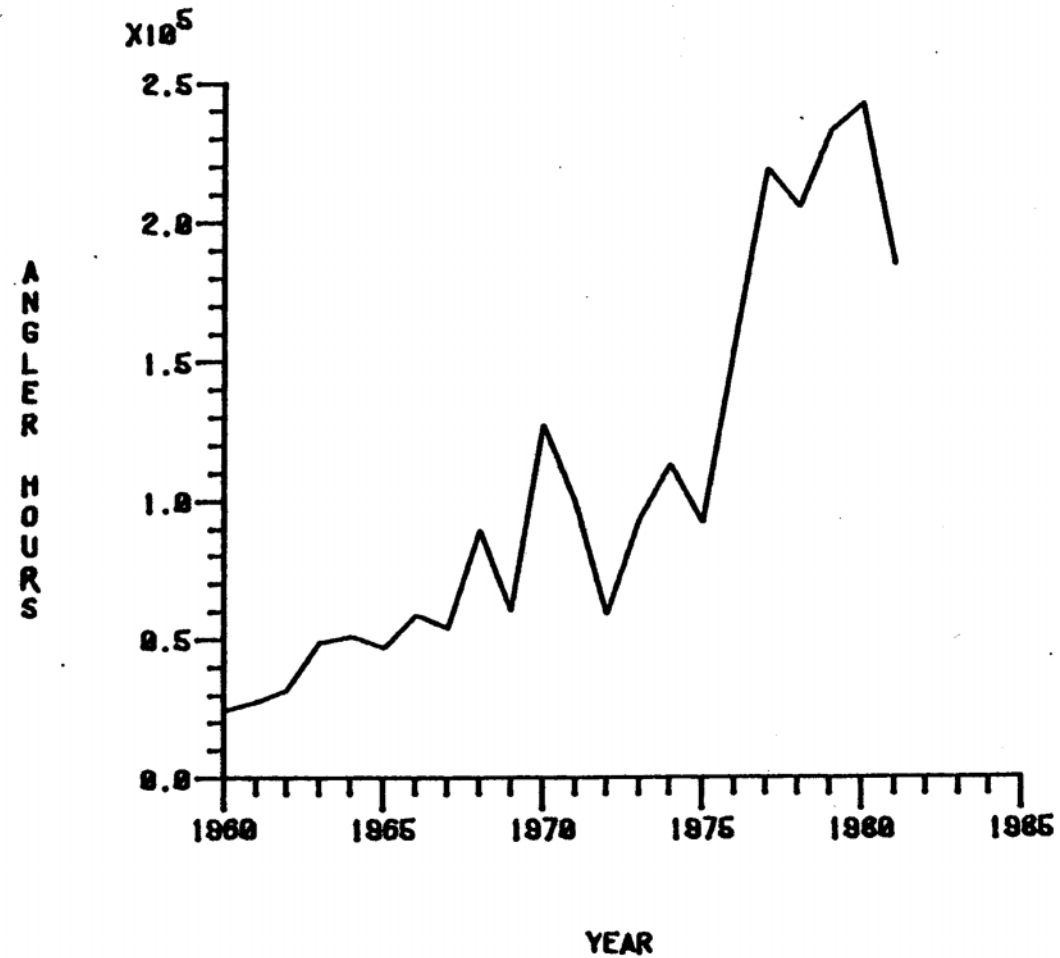
	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Angler Trips	22,790	15,150	21,773	20,766	18,004	30,591	44,240	45,803	41,810	49,124	36,920
Angler Hours	98,792	58,473	93,304	112,865	91,527	156,793	219,174	205,560	233,157	243,162	184,598
Mean Hrs./Trip	4.33	3.86	4.29	5.44	5.08	5.13	4.95	4.49	5.57	4.95	5.05
Chinook*	3,735	1,742	2,604	2,326	1,277	2,184	3,302	2,758	3,591	4,693	3,072
Chinook \geq 660 (711) mm**	2,328	912	1,465	1,808	987	2,184	3,302	2,758	3,591	...	...
Coho	3,052	6,274	2,576	5,622	4,541	6,873	8,635	13,039	5,995	8,097	6,299
Pink	435	575	909	1,110	824	446	1,997	5,978	4,819	4,498	3,389
Chum	380	224	75	89	108	167	123	234	289	389	161
Sockeye	8	0	0	32	21	146	1,243	2,265	29	...	44
TOTAL SALMON	7,610	8,815	6,164	9,179	6,771	9,816	15,300	24,274	14,723	17,680	12,965
Trout and Char	922	2,147	1,319	742	803	205	1,334	881	882	924	316
Pacific Halibut	1,450	1,833	3,098	1,366	756	915	1,026	704	5,242	8,657	6,736
Other Species	143	30	540	738	259	355	400	162	1,742	3,307	2,832

Prior to 1976, there was no minimum size; in 1976, minimum size was 660 mm; and from 1977 to 1980, 711 mm was the minimum size.

* Seasonal harvest of chinook.

** The number of chinook longer than 660 mm in the seasonal chinook harvest during 1960-1976, and the number of chinook longer than 711 mm in the seasonal chinook harvest occurring in 1977-1981 during that portion of the year under restricted size limits.

FIGURE 2. SEASONAL ANGLER HOURS IN THE JUNEAU MARINE
SPORT FISHERY, MAY 1-SEPTEMBER 3, 1960-1981.



chinook/hr/angler versus .024 chinook/hr/angler, respectively. This observed difference is not statistically significant ($t=1.607$). Pooling weekday and weekend data, the CPUE for chinook salmon was .026 chinook/hr/angler or 38.3 hours per "legal" chinook, based on salmon hours fished.

The term "legal" chinook refers to size limitations presently placed on this species in Southeast Alaska. There is no size limitation from April 1 through June 14 and any size chinook is considered legal and may be kept. However, from June 15 through March 31, chinook must be at least 711 mm (28 inches) in total length to be legally harvested.

In the Juneau area, older, larger fish predominate in the May and early June catches according to Finger and Armstrong (1965 a,b). After mid-June, however, the average size and age decreases notably, indicating a shift in stock composition to immature "feeders".

In May, the bulk of the angling effort was along the northern mainland shore, an area known locally as the Breadline. During the month of May, 62% of all sport salmon anglers on the water fished this area. Their efforts netted them 57% of all the chinook salmon taken during that month. The second most heavily fished area was the North Pass, about 8 miles northwest of the Breadline. Approximately 10% of all salmon angling effort during May occurred at that location. While there was considerably less effort at the North Pass, anglers caught 15% of the total May chinook catch there. The anglers, willing to travel the extra distance to the Pass, found more productive fishing in the less congested waters there.

The CPUE for chinook during May was .035 chinook/hr/angler and it took salmon anglers an average of 6.2 fishing trips to catch one chinook salmon. The best weekly catch rate for chinook this season, .055 chinook/hr/angler, occurred during the week of May 4-10.

From May 1 through June 14, 1981, 12.3% of the chinook sampled were under 711 mm (28 inches) total length. Schwan (1980) computed sub-seasonal (weekly) harvest estimates for this period and showed that 50% of the seasonal chinook catch was harvested during this 6-week period during 1980. Assuming that 50% of the 3,292 chinook, or 1,646 chinook, were taken between May 1 and June 14, 1981, and given that 12.3% of the sampled catch was under 711 mm total length, then an estimated 202 ($.123 \times 1,646$) "undersized" chinook salmon were harvested during this time.

Facility released chinook salmon contributed approximately 2% of the chinook captured in the Juneau marine sport fishery. Kissner (pers. com., 1981) reported that approximately 86,000 wild chinook salmon were tagged in the Taku and Stikine River systems in 1981, bringing the total to over 261,000 since 1978. While there were three voluntary recoveries this season from wild Taku stocks, no contribution estimate can presently be determined (Table 4).

Coho Salmon

The first coho salmon to appear in the survey was caught in early June. By late June, more coho salmon were being landed than chinook salmon, and angling pressure was directed towards catching cohos.

This was the second year that the catch of coho/salmon-hr/angler has been recorded. The mean catch rate for coho salmon during the 1981 coho season (periods 10-22) was .077 coho/salmon-hr/angler compared to .087 coho/salmon-hr/angler during 1980. The reciprocals are 13.0 hours per coho and 11.5 hours per coho, respectively. The difference between these seasonal mean catch rates is only mildly statistically significant ($t=1.95$, $d.f.=6041$) at the 90 percent level ($p<.10$).

Early season coho catch rates were slightly below average during 1981, and other fishery indicators led many biologists to think it was a bad year for returning coho salmon. The Juneau sport fishery seemed to be a relative bright spot. The local coho fishery improved dramatically in mid August as catches were suddenly above average. Coincidentally or not, this came just after a ten day commercial troll closure. It is not possible to say the improvements in the Juneau based sport troll fishery was totally due to the extensive commercial closures.

There were seven tagged coho recovered by recreational anglers this season. The majority of these were from Auke Lake wild stocks released in May and June, 1980. Their contribution to the fishery could not be determined due to the lack of total release information (Table 4).

Halibut Sport Fishery

Twenty percent of the marine anglers were targeting on Pacific halibut during May. This was nearly twice as much as during May of the previous year and reflected the overall increased pressure directed towards this species. During the 1981 season, 29% of the total sport fishing effort was directed toward the taking of Pacific halibut, compared to 20% during 1980. Preference for halibut as the target species was as high as 51% during one week of the 1981 season. Surprisingly, this occurred in mid-June when the catch success for halibut was relatively poor and the season's second best catch rate for chinook salmon was observed. As a possible explanation, fishermen may have targeted on this bottom fish rather than salmon because catch rates for halibut were still nearly twice as good as those for chinook. Also, the coho and pink salmon had not begun to appear in the sport fishery in any significant numbers.

The best halibut catch rates occurred in mid to late September, 2 to 3 weeks later than during the previous year. While angler success was good throughout the 1981 season, mean catch success, at 7.1 hours per halibut, was still 32% below the seasonal catch rate during 1980. There was also a significant difference this season in catch rates for halibut between weekdays and weekends. Weekend anglers required about 25% more time to catch a halibut. This may have been due to overcrowding on the popular "hot spots" as well as an increased number of inexperienced anglers on the water during the weekend.

As angling pressure increased on halibut, many demersal fishes were taken incidentally, particularly rockfish. Carlson and Haight (1972) studied the yellowtail rockfish, Sebastes flavidus (family Scorpaenidae), in southern Lynn Canal waters and found it to exhibit a home site preference and homing ability. This, coupled with slow growth, lead Carlson and Haight to conclude that local populations of this species could easily be over harvested. Hence, more specific information is needed concerning the sport harvest of demersal fishes because it appears that this species could be severely impacted from angling pressure (also, see Beamish, 1979).

Dolly Varden Char

Juneau area marine recreational anglers harvested an estimated 336 Dolly Varden char this season. This was only 34.4% of the estimated harvest during 1980. As in the past, char were almost always taken as an incidental catch by salmon anglers. There were no new regulatory changes enacted and there were no changes in the creel survey methodology between 1980 and 1981. Therefore, the decline in the catch of Dolly Varden cannot be attributed to either of the factors. It does not seem reasonable to assume that marine anglers in 1981 chose to release the majority of the char that they hooked while fishermen during the preceding year elected to keep their catch, nor does it seem likely that anglers became any less adept at catching this species. It would appear, therefore, that the number of char available to the marine angler may be decreasing.

The mean size for marine boat-caught Dolly Varden during 1980 was 444.4 mm. Armstrong (1974) determined that immature char in Southeast are less than 280 mm, while mature char are greater than 320 mm (12.6 inches). More than 90% of the mature fish are 4-7 years old. He also concluded that most Dolly Varden appear to have very strong homing traits and a distinct migratory pattern. Most Dolly Varden char spawn between mid-September to mid-October, and spawn each year after reaching maturity (Armstrong, 1974). Up to 50% of the females spawning for the first time survive to spawn again (Armstrong and Kissner 1969). Fecundity of mature spawning females is between 1,500 and 7,000 eggs. Blackett (1973) showed that in some populations the number of eggs per female shows a strong positive correlation with the fish's size.

Auke Lake, near Juneau, is an important overwintering area for Dolly Varden. A weir located below the outlet of Auke Lake has allowed biologists to monitor the length frequency distribution of out-migrating Dolly Varden from the lake during 1970, 1980, and 1981. These data indicate a dramatic decrease in the number of char greater than 300 mm over the years and a possible continued decline in the number of larger char just since 1980. However, the last 2 winters have been mild and it appears that Dolly Varden smolt production in Auke Lake, as well as in other local systems, has been relatively good. The number of immature char seen outmigrating from Auke Lake has apparently not decreased.

The fact that local marine boat anglers catch mostly larger, mature Dolly Varden, coupled with the above data, tends to suggest that the marine boat fishery may be largely responsible for the reduced number of large Dolly Varden in the Juneau area.

35th Golden North Salmon Derby

The Territorial Sportsman began a salmon fishing contest known as the Golden North Salmon Derby in 1947. In the last 10 years, the derby has averaged 8,042 angler validations for this 3-day event. This year's participation, despite excellent weather, was the second lowest turnout since 1971. Although the number of derby entrants in 1981 slightly outnumbered those in 1980, they caught 83% more chinook salmon. Mean angling success in 1981 for this species was almost 69% better than that occurring from 1975 through 1980.

While chinook fishing was above average during the 1981 derby, coho catch rates were below average. However, few derbies have been held on the same dates over the years. While some have occurred as early as July 18, when chinook fishing is likely to be better, others have begun as late as August 22, when coho fishing would be better. Consequently, it is difficult to do anything more than make generalizations when comparing these catch rates between various years. Past unpublished tagging data on file and recent racial studies (Kissner, 1973; 1974; 1975), have shown that Area 111 (which includes the Juneau marine survey area) is a fairly important rearing area for immature chinook of Stikine and Unuk River origin. While no tagged chinook from these wild stocks showed up in the derby catch, facility reared chinook from the Fisheries, Rehabilitation, Enhancement, and Development (FRED) Division's Crystal Lake Hatchery and the National Marine Fisheries Service's hatchery at Little Port Walter, as well as those reared in Washington and Oregon facilities, did appear in the derby catch (Table 4).

Personnel from the Sport Fish Division have been monitoring the Derby take home catches for the last 7 years and estimate that during this time over 52% of the total derby catch of chinook salmon have been taken home. The reasons why derby anglers retain their catch are probably numerous and peculiar to each individual. With the increased angler demand for salmon, particularly chinook salmon, they have increased in value to such an extent for local anglers that if their fish is not sufficiently large to have a reasonable probability of winning a prize, they are not entered into the competition. This year, competing anglers took home approximately 50% of the chinook they landed. Derby fishermen also took home over 69% of the coho salmon caught and over 64% of the pink salmon catch.

The derby effort and catches are a significant component of the local sport fishery. In 1981, 21% of the total catch of chinook salmon, 20% of the total catch of coho salmon, and 10% of the seasonal catch of pink salmon were taken during the 3 days of derby fishing. More interestingly, halibut, which are not eligible for any derby prizes, were being caught and taken home at a rate 100% higher than during the 1980 derby. Of the total seasonal halibut catch in the Juneau marine area this season, 12% were taken as an incidental catch in the derby. It is important, therefore, to closely monitor the derby take home catches of bottom fishes, as well as the salmon.

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APPENDIX

Table 1. Comparative seasonal angler effort and catch for Juneau area marine recreational fishery, May 1 through September 3, 1971-1981.

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Angler Trips	22,790	15,150	21,773	20,766	18,004	30,591	44,240	45,803	41,810	49,124	36,920
Angler Hours	98,792	58,473	93,304	112,865	91,527	156,793	219,174	205,560	233,157	243,162	184,598
Mean Hrs./Trip	4.33	3.86	4.29	5.44	5.08	5.13	4.95	4.49	5.57	4.95	5.05
Chinook*	3,735	1,742	2,604	2,326	1,277	2,184	3,302	2,758	3,591	4,693	3,072
Chinook \geq 660 (711) mm**	2,328	912	1,465	1,808	987	2,184	3,302	2,758	3,591	...	...
Coho	3,052	6,274	2,576	5,622	4,541	6,873	8,635	13,039	5,995	8,097	6,299
Pink	435	575	909	1,110	824	446	1,997	3,978	4,819	4,498	3,389
Chum	380	224	75	89	108	167	123	234	289	389	161
Sockeye	8	0	0	32	21	146	1,243	2,265	29	...	44
TOTAL SALMON	7,610	8,815	6,164	9,179	6,771	9,816	15,300	24,274	14,723	17,680	12,965
Trout and Char	922	2,147	1,319	742	803	205	1,334	881	882	924	316
Pacific Halibut	1,450	1,833	3,098	1,366	756	915	1,026	704	5,242	8,657	6,736
Other Species	143	30	540	738	259	355	400	162	1,742	3,307	2,832

Prior to 1976, there was no minimum size; in 1976, minimum size was 660 mm; and from 1977 to 1980, 711 mm was the minimum size.

* Seasonal harvest of chinook.

** The number of chinook longer than 660 mm in the seasonal chinook harvest during 1960-1976, and the number of chinook longer than 711 mm in the seasonal chinook harvest occurring in 1977-1981 during that portion of the year under restricted size limits.

Table 2. Comparative chinook salmon caught per angler hour of effort during the Juneau area marine recreational fishery.

Period	1	2	3	4	5	6	7	8	9	10	11	12	Seasonal
*Dates	5/01- 5/14	5/15- 5/28	5/29- 6/11	6/12- 6/25	6/26- 7/09	7/10- 7/23	7/24- 8/06	8/07- 8/20	8/21- 9/03	9/04- 9/17	9/18- 10/01	10/02- 10/15	Mean
1960	.092	.047	.072	.063	.065	.033	.020	.031	.008	.000	...	...	.049
1961	.051	.064	.060	.034	.036	.029	.035	.020	.005	...	...	...	.036
1962	.022	.033	.030	.014	.003	.014	.034	.008	.015	...	...	...	.016
1963	.090	.089	.086	.048	.060	.045	.030	.019	.020	.013	...	...	.046
1964	.075	.070	.065	.053	.045	.078	.039	.022	.013	...	...	...	.054
1965	.055	.069	.059	.028	.027	.037	.032	.014	.013	...	...	...	.035
1966	.000	.036	.026	.033	.027	.020	.022	.028	.034	...	...	...	.029
1967	.008	.031	.045	.035	.032	.025	.019	.012	.018	...	...	...	.030
1968	...	...	.028	.033	.036	.048	.035	.028	.023	...	...	...	.037
1969	...	...	.036	.047	.048	.034	.033	.030	...	...	...	...	.038
1970	...	...	.046	.025	.016	.028	.015	.017	.013	...	...	...	.021
1971	.014	.041	.052	.038	.032	.034	.033	.040	.027	.015	...	...	.015
1972	...	...	.016	.031	.023	.033	.029	.049	.024	.028	...	...	.029
1973	.050	.029	.032	.035	.048	.057	.029	.012	.023	...	...	...	.030

* Actual dates for each period may slightly vary between years.

Table 2. (Cont'd.) Comparative chinook salmon caught per angler hour of effort during the Juneau area marine recreational fishery.

Period	1	2	3	4	5	6	7	8	9	10	11	12	Seasonal
*Dates	5/01- 5/14	5/15- 5/28	5/29- 6/11	6/12- 6/25	6/26- 7/09	7/10- 7/23	7/24- 8/06	8/07- 8/20	8/21- 9/03	9/04- 9/17	9/18- 10/01	10/02- 10/15	Mean
1974	.007	.017	.015	.036	.031	.017	.018	.014	.017	.017	...	...	.020
1975	.030	.018	.034	.022	.018	.030	.007	.007	.002	.004	.004	...	.012
1976	.023	.026	.024	.030	.020	.016	.007	.006	.006	.003	.002	.000	.013
1977	.015	.032	.023	.025	.011	.016	.010	.001	.003	.003	.000	...	.016
1978	.037	.029	.024	.023	.008	.004	.005	.001	.004	.002	.000	...	.013
1979	.032	.037	.019	.016	.009	.021	.010	.004	.008	.004	.001	...	.015
1980	.028	.036	.033	.024	.019	.013	.014	.010	.008	.010	.009	...	.019
1981	.036	.024	.025	.020	.013	.016	.009	.007	.008	.006	.004	...	.016

* Actual dates for each period may slightly vary between years.

Table 3. Comparative coho salmon caught per angler hour of effort during the Juneau area marine recreational fishery.

Period	1	2	3	4	5	6	7	8	9	10	11	12	Seasonal Mean
*Dates	5/01- 5/14	5/15- 5/28	5/29- 6/11	6/12- 6/25	6/26- 7/09	7/10- 7/23	7/24- 8/06	8/07- 8/20	8/21- 9/03	9/04- 9/17	9/18- 10/01	10/02- 10/15	(6/26-9/03)
1960	.000	.000	.003	.002	.003	.009	.055	.065	.092	.034	...	...	.045
1961	.000	.000	.000	.001	.006	.042	.079	.054	.100	...	...	...	.056
1962	.000	.000	.000	.010	.002	.014	.034	.086	.126	...	...	...	.052
1963	.000	.000	.002	.006	.020	.044	.102	.145	.121	.143	...	...	.086
1964	.000	.001	.002	.004	.035	.041	.099	.095	.131	...	...	...	.080
1965	.000	.000	.015	.007	.026	.074	.093	.114	.108	...	...	...	.083
1966	.000	.000	.001	.002	.019	.028	.049	.085	.063	...	...	...	.049
1967	.000	.000	.000	.006	.015	.019	.034	.074	.063	...	...	...	.041
1968	...	...	.000	.061	.072	.119	.143	.149	.232	...	...	...	.133
1969	...	...	.000	.012	.026	.030	.081	.099	...	...	...	...	.059
1970	...	...	.002	.002	.021	.042	.057	.100	.106	...	...	...	.065
1971	.000	.000	.002	.005	.013	.038	.080	.087	.073	.196	...	...	.058
1972	...	...	.000	.051	.093	.102	.237	.127	.133	.120	...	...	.142

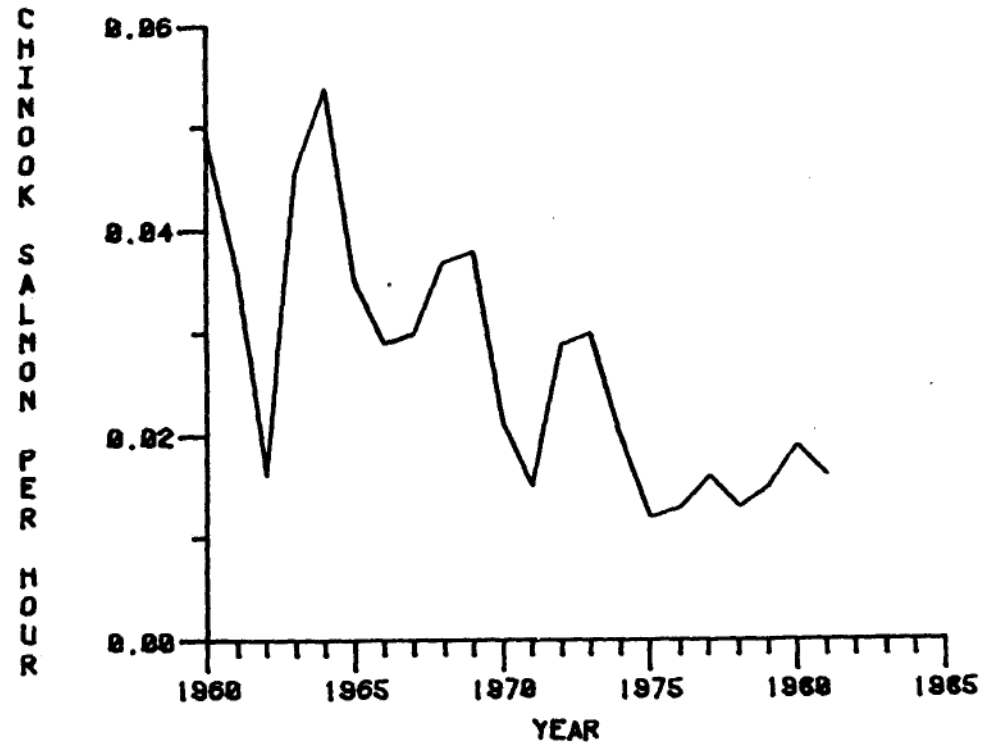
* Actual dates for each period may vary slightly between years.

Table 3. Comparative coho salmon caught per angler hour of effort during the Juneau area marine recreational fishery (Cont'd).

Period	1	2	3	4	5	6	7	8	9	10	11	12	Seasonal Mean
*Dates	5/01- 5/14	5/15- 5/28	5/29- 6/11	6/12- 6/25	6/26- 7/09	7/10- 7/23	7/24- 8/06	8/07- 8/20	8/21- 9/03	9/04- 9/17	9/18- 10/01	10/02- 10/15	(6/26-9/03)
1973	...	.000	.005	.006	.023	.023	.034	.061	.096	...	...	...	.047
1974	.000	.002	.001	.008	.044	.066	.087	.089	.092	.133	...	...	.076
1975	.000	.000	.004	.002	.025	.036	.061	.097	.066	.081	.060	...	.059
1976	.000	.000	.002	.006	.029	.040	.054	.063	.079	.065	.060	.005	.053
1977	.000	.001	.000	.013	.044	.081	.068	.058	.056	.045	.016	...	.061
1978	.000	.000	.000	.015	.065	.092	.129	.143	.106	.065	.055	...	.107
1979	.000	.000	.000	.002	.014	.037	.039	.043	.090	.078	.003	...	.041
1980	.000	.000	.001	.001	.015	.047	.068	.089	.083	.057	.060	...	.055
1981	.000	.000	.000	.000	.021	.034	.046	.085	.101	.067	.018	...	.034

* Actual dates for each period may vary slightly between years.

FIGURE 1. MEAN CATCH RATES FOR CHINOOK SALMON IN THE
JUNEAU MARINE SPORT FISHERY, 1960-1981
(BASED ON ALL SPECIES HOURS FISHED). *



* 1980 INCLUDES 20% EFFORT TARGETING ON NON-SALMONID FISHES
1981 INCLUDES 29% EFFORT TARGETING ON NON-SALMONID FISHES

FIGURE 2. WEEKLY CATCH RATES FOR CHINOOK SALMON IN THE JUNEAU MARINE SPORT FISHERY DURING THE 1981 SEASON (BASED ON SALMON HOURS FISHED).

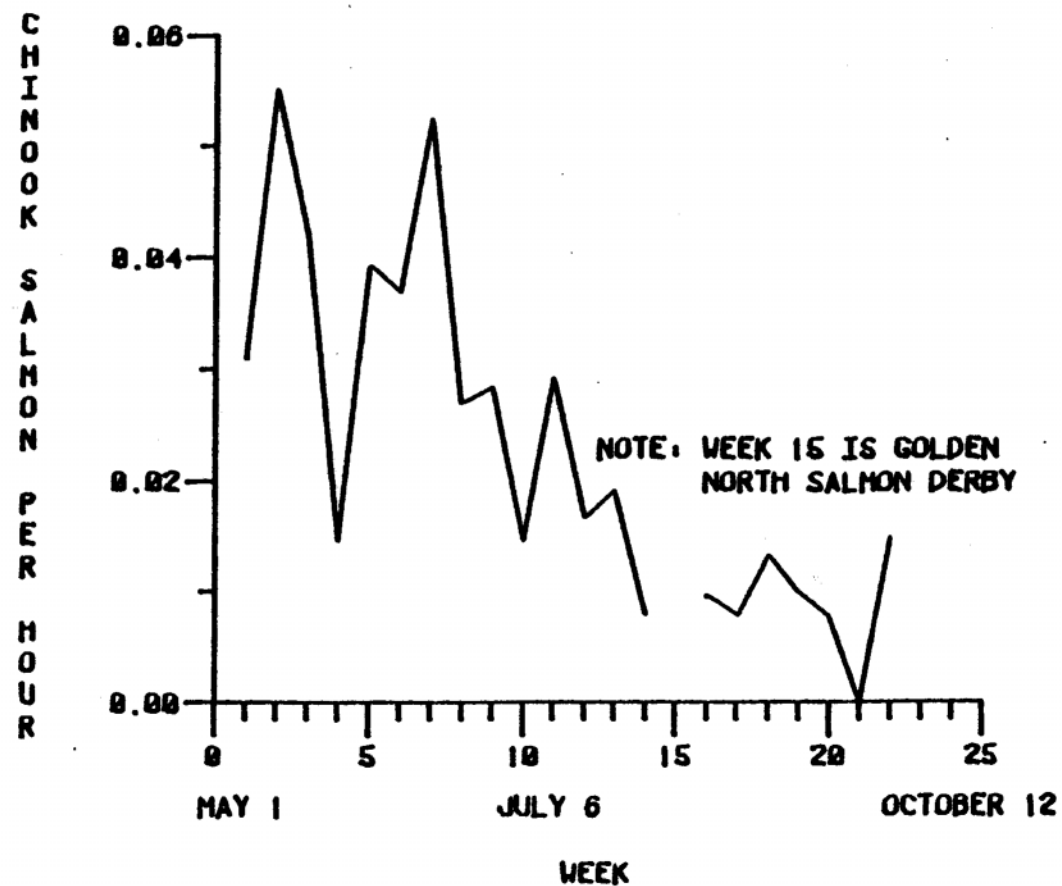
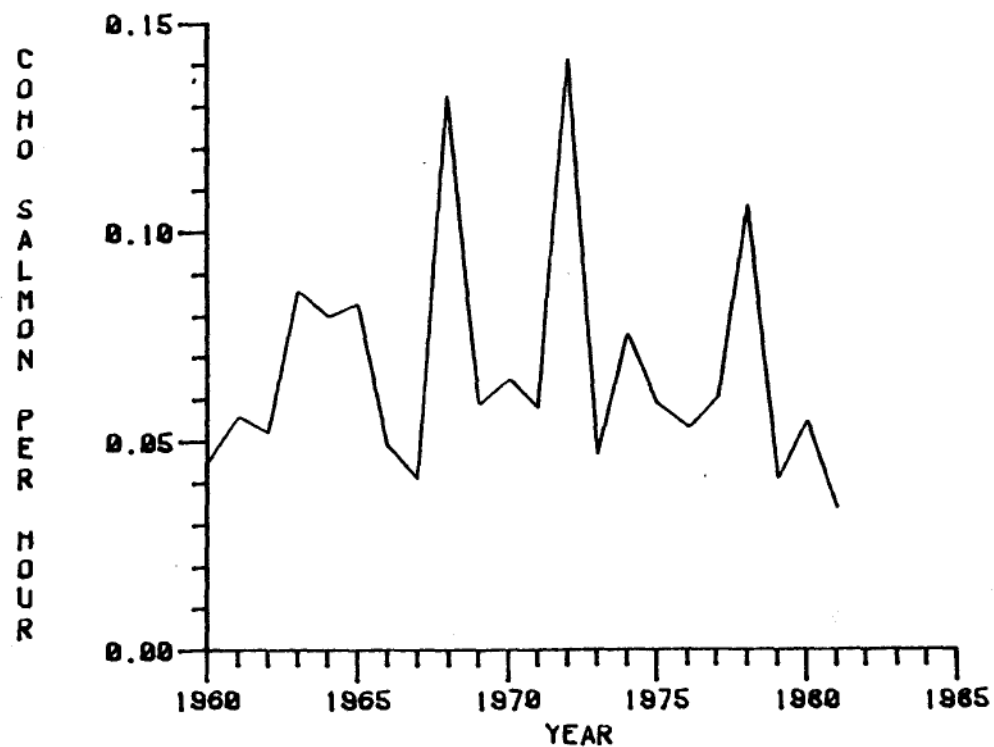


FIGURE 3. SEASONAL MEAN CATCH RATES FOR COMO SALMON
IN THE JUNEAU AREA SPORT FISHERY, 1960-1981
(BASED ON ALL SPECIES HOURS FISHED). *



* 1980 INCLUDES 20% EFFORT TARGETING ON NON-SALMONID FISHES
1981 INCLUDES 29% EFFORT TARGETING ON NON-SALMONID FISHES

FIGURE 4. WEEKLY CATCH RATES FOR COHO SALMON IN THE JUNEAU MARINE SPORT FISHERY DURING THE 1981 SEASON (BASED ON SALMON HOURS FISHED).

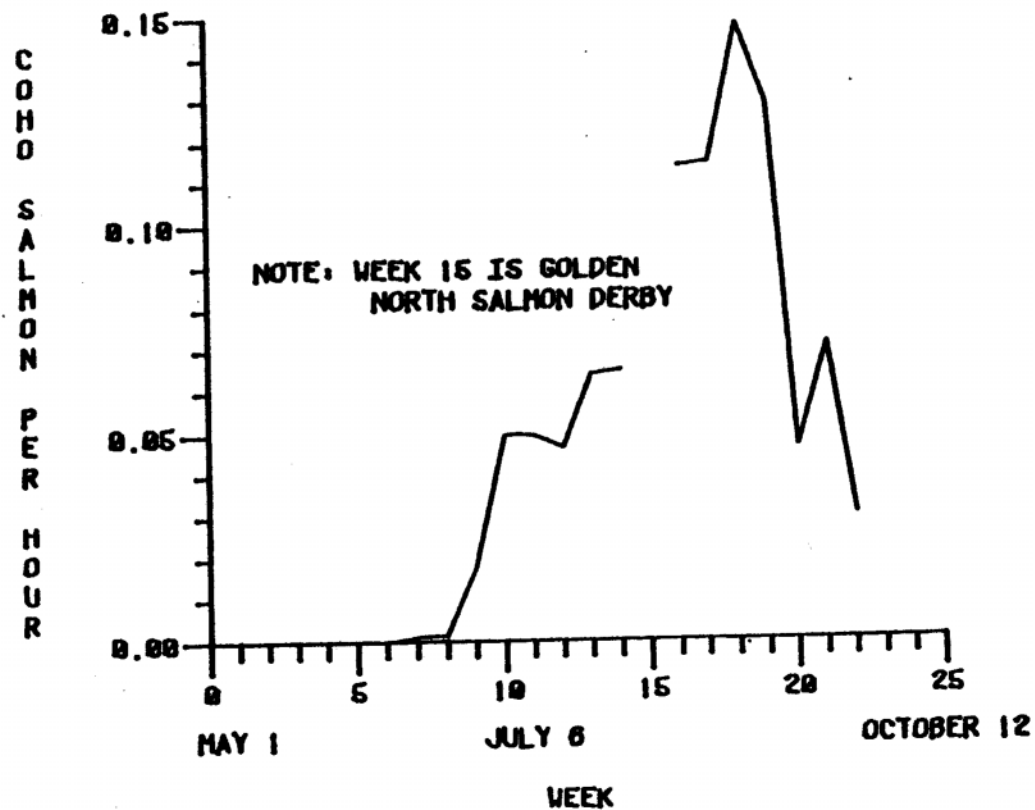


FIGURE 5. WEEKLY CATCH RATES FOR PACIFIC HALIBUT IN THE JUNEAU MARINE SPORT FISHERY DURING THE 1981 SEASON (BASED ON HALIBUT HOURS FISHED).

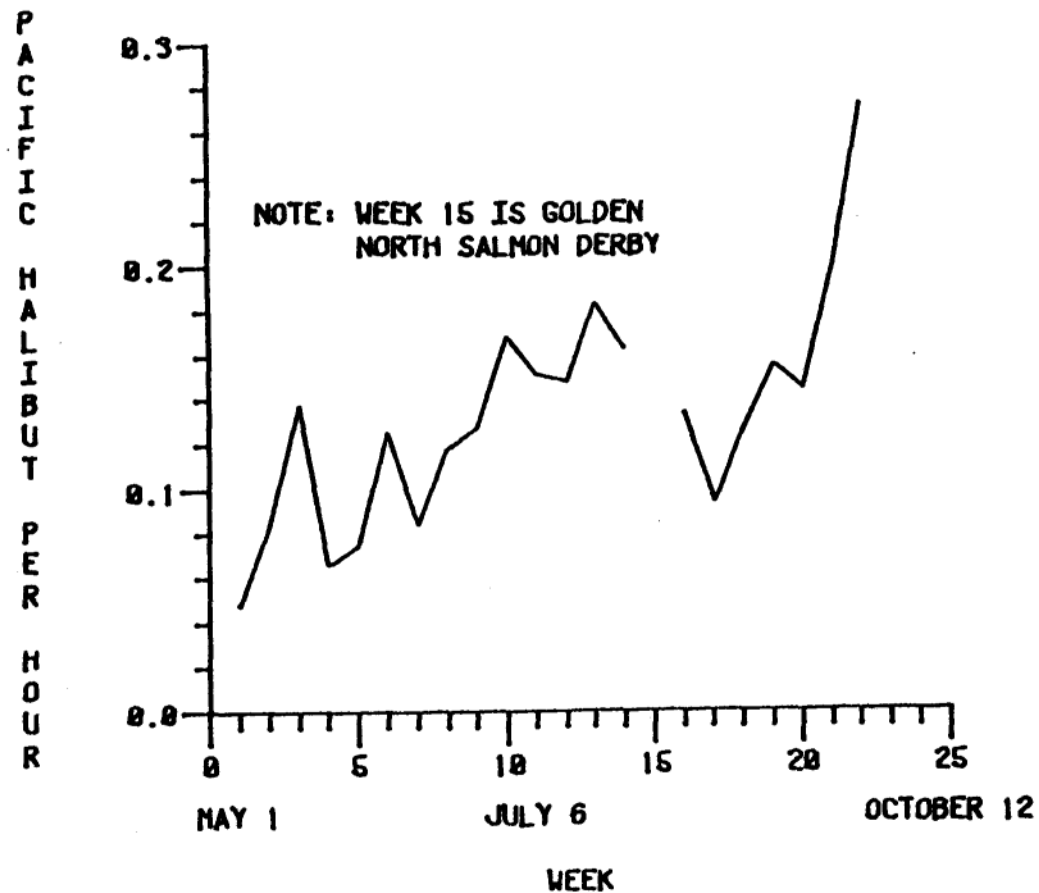


FIGURE 8. WEEKLY CATCH RATES FOR CHINOOK SALMON, COHO SALMON, AND PACIFIC HALIBUT IN THE JUNEAU MARINE SPORT FISHERY DURING THE 1981 SEASON.

